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CORUNDUM, MARBLE, AND QUARTZ DEPOSITS IN THE URALS

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CORUNDUM DEPOSITS IN THE POLEVSKOY AND KYSHTYM AREAS

Ye. A. Kuznetsov

In the summer of 1925, the author became familiar with a number of corundum deposits. At the request of the "Russkiye Samotsvety" (Russian Gems) Trust he did prospecting work in Kosoy Brod in the area near Polevskoy and Sverskiy, as well as in the Kyshtym area. In this article, the author will give only a brief, general description of the geological conditions of corundum deposits. A more detailed treatment of the subject will follow after all of the collected material has been processed.

In the Kosoy Brod area, the Kokovina emery deposits have been investigated (Map No 1). The deposits are located in Kramory, about 3 kilometers north of Kosoy Brod and east of the railroad. This deposit has been mined irregularly since its discovery near Kokovina. At present, the southern portion is laid open after having been mined in 1918, but the northern part is completely blocked up and inaccessible to observers. The deposit contains a lens or vein in greyish, coarsegrained marble. The vein reaches a width of 2 meters. In the southern part the dip is to the west, in the northern part it is vertical. The corundum-bearing rock apparently contains, in addition to corundum, chloritoid (this has not been definitely located) and pyrite. Magnetite, which is usually found in rocks of the emery variety, is absent in this location. The emery rock is penetrated by streaks of chloritoid and diaspore. The contact with marble is abrupt. The deposit is covered by an ocherous, ferrous layer, which is a product of pyrite decomposition.

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The marble rock, containing corundum ore, is surrounded from the north, south, and east by serpentine rocks and products of their disintegration, and on the west it borders on a small ravine near the railroad. Here prospectors sometimes find blocks of corundum rock. According to their statements, the bottom of the ravine is covered with crystalline limestone which actually comes to the surface in the Kosoy Brod iron mine in the south. The same streak also contains other crystalline varieties of schist, quartzite, micaceous, and sericitic schist. As these varieties of rock disintegrate easily, they often change into eluvium and are covered by heavy layers of diluvium. On the Mokraya Yelan', there are no outcrops of original rocks and only from individual prospecting pits can one determine the composition of the rock. There are a number of pits in this location which were made in the process of prospecting for gold, and at that time corundum rock of the Kokovina type was struck. All of these pits are located almost in one line, parallel to the direction of the schist belt.

East of the Kokovina deposit, there is a belt of serpentine rocks cut through by veins of granite, pegmatite, and aplite. The serpentines have undergone great changes and are transformed into talc and chlorite rocks, as well as into talcous carbonate rocks with ferromagnesian carbonate. The formation of granite veins, cutting through the serpentines, branches out from the Sysert' granite massif, lying east of the serpentine belt. On the outskirts of the granite massif one finds large quantities of serpentine in the granite, greatly changed and transformed into actinolite, chlorite, talcous, chlorite-garnet, epidotic, and other varieties of rocks.

In the Kyshtym region, the area from the plant to Lake Buldym in the Kasli timber region was investigated, and also the area of the Techensk deposits (Map No 2).

The Techensk and Kyzyltash deposits of corundum are similar to those of Kosoy Brod. The surrounding rocks consist of limestone and a number of porphyries and porphyrites, which have not been further investigated. On the east shore of Lake Irtyash, these rocks border on a belt of ottrelite-sericite-chlorite schists, which contain garnet in some places. The deposits also contain chloritoid and corundum rocks. The latter mineral is present in considerable quantities in some places. In the outlying regions the corundum content diminishes. These rocks have not yet been closely studied by laboratory tests and their origin has not been determined.

On the Borzovka River (Map No 3) we have a belt of serpentines, lying west of alkaline rocks of the Nikol'skaya and Borzovochnaya mountains. The serpentines are penetrated by granite veins, changing over into veins of plagioclasites and kyshtymite. The serpentines originated from harzburgites (olivine-bronzite). By contact they were changed into actinolite, talcous, and chlorite rocks and crossed by veins of siliceous and carbonate (calcite) rocks. The phenomena connected with this system of veins are very complex and should be closely studied. The veins of igneous rocks are surrounded by a border of magnesian mica of bronze color. Apatite is found in chlorite rocks, and in one of the mica streaks apatite was found forming crystals up to 10 centimeters.

All correlations of the Kyshtym system of veins correspond completely to analogous formations in South Africa (Hall, On the Marundites and Allied Corundum-bearing Rocks in the Leydsdorp District of Eastern Transvaal), as well as to a system establishing the "desilification" /desilicification ?/ of granite veins under the influence of interaction with basic rocks (Gordon, "Desilicificated Granite Pegmatites," Proc. Acad. Nat. Sci. Philadelphia; Bowen, "The Behavior of Inclusions in Igneous Magmas," Journal of Geology, Vol XXX, No 6, 1922; Fersman, A. Ye., Dragotsennyye i tsvetnyye kamni Rossii (Precious and Colored Stones of Russia), Vol II).

Prospector Kazakov found a new corundum deposit on the shore of Lake Sugomak (Map No 4). A similar deposit was found in the extension of actinolite hills in the south, and corundum was also found near the Yamskaya road. This deposit is of an original type. It represents a vein in actinolitic rock, accompanied by all the characteristic features of kyshtymite veins. However, the composition of the vein rock is entirely different. It is a pyroxenic corundum rock, or sometimes hornblendite, which passes over by selvages into garnet-biotite rock with corundum and plagioclase.

In the deposit discovered by Academician A. P. Karpinskiy, 4½ kilometers from the Kasli Plant, samples of corundum-bearing rocks were collected. The conditions of their occurence were described by A. V. Nikolayev, and the author has nothing to add to his data at present, before the material has been studied. In addition, a corundum deposit on the Mendarkin Peninsula, discovered by D. S. Belyankin, has been inspected. This does not have any practical value.

Finally, another type of corundum deposits has been developed among the alkaline massifs of the Kasli and Kyshtym timber regions. The deposit on Nikol'skaya Gora in the Kasli and Kyshtym regions represents schlieren or veins of coarse-grained alkaline syenite with corundum crystals. Corundum crystals were also found in syenite west of Lake Sungul', in the Kasli region.

URAL MARBLE IN KYSHTYM OKRUG

M. A. Gordiyenko

The Sugomak deposits are located 6½ kilometers to the south of the Kyshtym Plant, at the foot of "Sugomak" Mountain. These marble deposits extend in a wide belt from southwest to northeast for 5.5 kilometers, but the marble has been quarried only in an area of 2 kilometers (Diagram No 4). The marble in this location was first quarried in the 1840's and was obtained for the plant as a fusing agent and for burning lime. The output per year went up to 1,000 tons. During the last few years before World War I, the annual marble output was 3,000 tons, and marble, as a fusing agent, was sent to the Izhevsk plants.

In the southeast section of these deposits the marble has a light blue color but in the northwest section it changes to pure white. At present [1926] marble is cut in blocks for fusing purposes and for the production of marble chips and marble flour. It is not possible at this time to cut and finish large regular blocks, as the marble flux was obtained by blasting with dynamite, which caused cracks in adjoining layers. Preliminary work is now being done and plans are made to begin the cutting and finishing of blocks in summer. The marble from these deposits is fine-grained, close in texture, and contains no metal oxides; therefore, it is absolutely nonconducting and can be used in the electrical industry. The marble reserves in this location are tremendous and can be estimated at hundreds of thousands of tons, suitable for processing. The delivery of marble blocks to Kyshtym Station does not present any difficulties. The distance is 6½ kilometers over a good highway.

The marble deposit near Polevskoy Plant is light grey to white in color and coarse-grained in texture. It has been quarried in Accordance with existing demands, and has been used exclusively for panels and pedestals for monuments.

The deposit near Mramorskoye Village is 4.5 kilometers from the village, on the road to Sverdlovsk. This marble is coarse-grained and white. It was used for the same purposes as the Polevskoy marble. This deposit, several kilometers long, was quarried extensively from 1900 to 1914, when there was great demand for tombstones and monuments. It was also used largely for marble chips and marble flour. This type of marble is not suitable for the electrical industry.

The grinding of marble has been continued up to the present. The marble is cut according to demand, usually in summer, and is hauled in winter. From this deposit, marble blocks weighing up to 170 tons have been obtained for pedestals of monuments. The marble occurs here in unbroken layers and is easy to cut.

UNEXPLOITED MARBLE DEPOSITS IN SVERDLOVSK OKRUG

M. A. Gordiyenko

The marble deposit in the Kasli region extends in two belts, in the east and west sections of this region. The deposit in the east section extends from southwest to northeast (Diagram No 5). Large outcrops of marble have been found in Districts No 10 - 6; on the east shore of Lake Irtyash; on the border between Districts 54 and 55; and in Districts 82 and 127. Some marble was used from Districts 54 and 55 for fusing purposes in the plant. The marble of these deposits is coarse-grained and white to mottled yellow in color. Its texture is greatly flawed, so that it can hardly be used as finishing material.

In the western part of this region outcrops of marble have been noted in Districts 66 and 77, near the Ural'skiy iron mine, and in District 131 near the Cheremshanskiy iron mine. The marble in this deposit is fine-grained and occurs in regular layers without cracks. The color is white to cloudy blue (Diagram No 6).

The western part of the Kyshtym region is extremely rich in marble. In addition to the Sugomak deposit mentioned before, which is being quarried, outcroppings of marble extend in a solid belt from north to south (Diagram No 7). The marble of these deposits has various colors, ranging from white to dark grey, and has a fine-grained texture. In its upper sections, the deposit has been dislocated, so that it is hardly possible to obtain large, regular blocks.

QUARTZ DEPOSITS IN THE KYSHTYM MINING OKRUG

M. A. Gordiyenko

Quartz is found in the Kyshtym Mining Okrug both in the form of vein accumulations and in the from of individual crystals of rock crystal, occurring in various sizes. The vein quartz ranges from transparent to milk qhite with a SiO_2 content up to 99.2 percent. The quartz in this location has been quarried for a long time and has been used almost exclusively in brick production, especially for making refractory bricks. This article gives a brief outline of quartz deposits in this region and the possibilities for using it, aside from brick production, in the glass and ceramic industry.

In the eastern portion of the Kyshtym region, two quartz deposits have been quarried since 1923. The first deposit is on the southern shore of Lake Irtyash and extends in the form of a broad vein from north to south, with small deflections to the southwest (Map No 1). The vein extends for 1.5 kilometers and is embedded in gneiss. The quartz in this deposit is milk white, and in some places semitransparent. The analysis of an average sample shows a SiO_2 content of 98.1 to 98.6 percent, and a Fe_2O_3 content of 0.4 to 0.8 percent, the iron content being visible mainly in brownish films on the cleavage planes. The annual output reaches 1,200 tons. The quartz is used solely in brick factories for the production of refractory bricks with a guaranteed SiO_2 content of not less than 98 percent and a Fe_2O_3 content of not more than one percent.

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